UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,440	10/14/2003	Donald E. Ackley	612,404-430	6873

34263 7590 09/08/2005

O'MELVENY & MEYERS LLP
610 NEWPORT CENTER DRIVE
17TH FLOOR
NEWPORT BEACH, CA 92660

EXAMINER	
BOWERS, NATHAN ANDREW	
ART UNIT	**PAPER NUMBER**
1744	

DATE MAILED: 09/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/686,440	ACKLEY ET AL.	
	Examiner	Art Unit	
	Nathan A. Bowers	1744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *111003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 10 November 2003 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Non-patent literature publications were not considered because they were not made readily available.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1) Claims 1, 4, 5, 6, 7, and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Anderson (US 5922591).

With respect to claims 1, 4, and 6, Anderson discloses a microfluidic device comprising a series of reaction chambers (Figure 3:202, 206, 210, 214, 218). The chambers are connected in series by channels (Figure 3:204, 208, 212, 216) so that adjacent chambers each have peripheral boundary defined by common intermediate

member. In this way, the common intermediate members are comprised of the solid walls between chambers surrounding each channel via. This construction is described in column 22, lines 44-54. Column 5, line 59 to column 6, line 9 and column 20, lines 59-65 teach that inlets and outlets are provided at each chamber, and that means are provided for introducing and expelling sample to and from the overall device. Column 22, line 55 to column 24, line 19 provides an example in which the first chamber is used for sample collection, the second chamber for purification, the third chamber for nucleic acid amplification, the forth chamber for labeling, and the fifth for probe array analysis. Anderson teaches in column 2, lines 20-30 and column 22, lines 55-57 that the device may be used for a variety of preparative and analytical operations in which individual chambers assume various functions. Therefore, it is an inherent feature of this invention that if a previously purified DNA sample is provided, initial isolation steps will be skipped so that DNA amplification takes place in the first chamber. Here, the DNA will selectively bind to primers and polymerase enzymes, thus constituting an affinity region. For example, in Figure 15a and in column 40, line 66 to column 41, line 37 an embodiment of the invention is detailed in which PCR proceeds in the first chamber.

Furthermore, Anderson teaches in column 35, lines 57-65 that a multitude of electrodes may be incorporated onto the hybridization arrays of the analysis chamber. This would allow an operator one to skip any fluorescent or radioactive labeling step, since the presence of nucleic acids bound to the probes can be detected electrically. In light of this teaching, it is possible for DNA amplified in a first chamber to move directly

to a second chamber comprising an array of electrodes that facilitate hybridization and detection.

With respect to claims 4 and 6, Anderson discloses the device in claim 1. It is taught in column 2, lines 20-30 and column 22, lines 55-57 that the device may be used for a variety of preparative and analytical operations in which individual chambers assume various functions. Therefore, it is an inherent feature of this invention that any operation may be conducted in any chamber given the proper circumstances. Purification of the biological sample may be accomplished in the first chamber, as it is well known in the art that purification is often the first step in most nucleic acid analytical procedures . Column 6, line 38 to column 8, line 13 describes a purification procedure in which "capture membranes" with pore sizes designed to selectively retain nucleic acids are implemented.

With respect to claim 5, Anderson discloses an embodiment of the invention in which a series of electrodes are implemented throughout the various chambers of the device to create movement of charged molecules within the fluid by creating an electrical current. In column 35, lines 44-55 it is taught that the electrodes may be placed adjacent to the channels connecting individual chambers.

With respect to claims 7 and 8, Anderson discloses the device in claim 1, wherein the first chamber is used to amplify nucleic acids. Anderson teaches a method in column 9, lines 9-60 that demonstrates how individual chambers within the disclosed device are capable of facilitating a polymerase chain reaction (PCR) procedure. It is an inherent feature of this invention that if a purified nucleic acid sample is previously

obtained, the first chamber of the device can be used for amplification. Once PCR is complete, the amplified nucleic acid is eluted through the channel via into the second chamber for further analysis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2) Claims 2, 3, 4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US 5922591) as applied to claim 1 above, and further in view of Hollis (US 5653939).

Anderson discloses the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 102 rejection above. Anderson further expresses certain design conditions which indicate that the first chamber includes an affinity region comprising a membrane fabricated to selectively retain nucleic acids. However, Anderson does not explicitly teach that the first chamber includes a plurality of electrodes.

Hollis discloses a microfluidic chamber comprising a chip with an array (Figure 1:10) of test sites (Figure 1:12). This is described in column 2, lines 30-43. Each test site contains a plurality of wells (Figure 4:42) that capture a portion of sample fluid that is poured across the array. A plurality of electrodes (Figure 4:16, 20, 21) are distributed within each well, so that the every test site comprises a multitude of electrodes according to column 4, lines 50-53. Column 11, lines 5-34 teach that hybridization

probes (Figure 4:22) are attached to each electrode, and column 7, line 64 to column 8, line 20 indicates that membranes are formed over electrodes to provide an adequate binding medium for the probes. Based on applicant's description of an affinity matrix in paragraphs [0010], [0041], and [0057] of the application, Hollis's electrode hybridization array meets the necessary criteria to be considered an affinity matrix.

Anderson and Hollis are analogous art because they are from the same field of endeavor regarding the detection and analysis of nucleic acids within a fluid sample.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the same array construction described by Hollis into the first chamber of Anderson's microfluidic device. In column 35, lines 57-65, Anderson states a desire to incorporate electrodes into hybridization analysis procedures that take place in various successive chambers following the first chamber. Since detection is often the ultimate goal, it would have been apparent to implement probe arrays in the first chamber as well to partially analyze the solution at the start, especially if a purified sample is already obtained. Hollis states in column 2, lines 41-52 that his electrode array is a low cost, small in size, and inexpensive, and, therefore, an attractive option for hybridization procedures. This is especially due to the fact that the electrodes not only present a safe and quick way of detecting nucleic acid binding, but also can serve to actively draw the ligand towards the probe by producing an electrical current. Furthermore, Hollis teaches in column 11, lines 5-34 and column 8, lines 13-17 that overlaying each electrode with a membrane is desirable because membranes enhance

the formation of covalent linkages between electrodes and probes, while keeping nucleic acids in solution from directly contacting the electrodes.

Therefore, it would have been obvious to combine Anderson with Hollis for the benefit of a microfluidic device with a first chamber consisting of a plurality of electrodes forming a hybridization array to obtain the invention as specified in claims 2, 3, 4, and 6.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 2, 5, 7, and 8 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, 4, 5, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, and 43 of U.S. Patent No. 6309602 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the immediate application are generic to those of the patent. Even though the patent speaks of a third chamber and other additional features, the claims of the application fall entirely within the scope of patent. Claims 1, 3, 4, 5, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, and 43 of U.S. Patent No. 6309602 B1 describe a

device comprising an inlet, a first chamber including a plurality of electrodes, a second chamber including an array of addressable electrodes, and intermediate member forming a via between the chambers, and an outlet. Claims 28, 29, and 30 disclose nucleic acid amplification techniques that are assigned to the first chamber.

Claims 1, 2, 3, 4, 5, and 6 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 3, 9, 10, 12, 16, 17, 18, 19, 20, 21, 22, 31, 33, 34, and 35 of U.S. Patent No. 6319472 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the immediate application are generic to those of the patent. Even thought the patent speaks of a third chamber and other additional features, the claims of the application fall entirely within the scope of patent. U.S. Patent No. 6309602 B1 describe a device comprising an inlet, a first chamber including a plurality of electrodes, a second chamber including an array of addressable electrodes, and intermediate member forming a via between the chambers, and an outlet. The first chamber can include an affinity matrix, an affinity membrane, and a region that has an affinity to nucleic acids.

Claims 1, 2, 3, 8, and 9 of U.S. Patent No. 6638482 B1 and claims 1, 2, 3, 5, 6, 7, and 8 of U.S. Patent No. 6375899 B1 can be used to make similar obviousness-type double patenting rejections.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Zanzucchi (US 5755942) and Nelson (US 6007690)

references teach the use of a compartmentalized microfluidic array in which chambers are connected by a via formed through a common intermediate member.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan A. Bowers whose telephone number is (571)272-8613. The examiner can normally be reached on Monday-Friday 8 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sun (John) Kim can be reached on (571)272-1142. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NAB

WILLIAM H. BEISNER
PRIMARY EXAMINER
GROUP 1744